SHARP SERVICE MANUAL

DIGITAL COPIER/PRINTER/ MULTIFUNCTIONAL SYSTEM OPTION

INSERTER

MODEL AR-CF2

CONTENTS

Parts marked with "⚠" are important for maintaining the safety of the set. Be sure to replace these parts with specified ones for maintaining the safety and performance of the set.

SHARP CORPORATION

[1] PRODUCT OUTLINE

This inserter is an optional unit for the AR-620 series of digital complex machines. With the inserter installed, blank sheets or printed sheets can be inserted as covers (made of cardboard) or tabbed sheets without being subject to the printing process (and without passing through a fixing unit). When the inserter is combined with a finisher (optional) and a punch unit (optional), printed sheets can proceed to the hole punching or stapling process without being subject to the copying process (or without passing through the main unit).

[2] SPECIFICATIONS

1. Basic specifications

A. Performance

Type of Installation	Floorstanding	
⚠ Delivery speed	Through mode (Horizontal transportation):	800mm/sec
	Straight mode:	800mm/sec
	Saddle mode (Reverse):	420mm/sec
Productivity	50 cpm (when A4 or letter-sized insert sheets are continuously transported/saddle mode not applicable)	
Transport reference	Center reference through (when horizontally transported)	
Loading capacity	100 sheets max. (80 g/m^2 or less) Maximum loading height: 12 mm (80g/m^2 or greater) Maximum loadable sheets: 30 (127g/m^2 or greater) Factor 0.6 or less applied to above limitations for special papers	
Offline function	Provided	
Manual operation section	Equipped with keys and LEDs	
Stapling	Possible	
Saddle stitching (With folding)	Possible	
Punching	Possible	
Paper jam handling	Paper feed/Transport unit	Paper feeding cover open/close
	Horizontal transport unit	Transportation guide open/close

B. Compatible paper types

Paper weight	60 – 256gm^2 (Normal paper, whose thickness should be less than 256μm)
Types	Normal paper, special paper (OHP films, colored paper, punched paper, tabbed paper)
Special papers	OHP films: Saddle mode (reverse) not applicable Punched paper: 2, 3, or 4 holes 　2 holes (φ6.5): Hole pitch: 80mm 　2 holes (φ8): Hole pitch: 70mm 　3 holes (φ8): Hole pitch: 108mm+108mm 　4 holes (φ6.5): Hole pitch: 80mm+80mm+80mm 　4 holes (φ6.5): Hole pitch: 21mm+70mm+21mm
⚠ Paper sizes	Ledger (LD), Legal (LG), Letter (LT), Letter R (LTR), Foolscap, Executive R, Invoice R

⚠ Size detection	The 3 destinations below are user-definable
	cm: A3, B4, A4, A4R, B5, B5R, A5R (Foolscap is manually specified on the operation panel of main unit)
	inch: LD, LG, LT, LTR, Executive R, Invoice R
	∗ Mixed loading is not possible. When offline, stapling and punching are possible only for papers that have the identical width (A3 and A4, B4 and B5, LD and LT). Note that compatibility with the finisher is not considered.
Paper sizes that can be stapled	Compliant with the specifications both of the main unit and the finisher.
Paper sizes that can be saddle stitched	Compliant with the specifications both of the main unit and the saddle finisher.
Paper sizes that can be punched	Compliant with the specifications both of the main unit and the punch unit.

C. Mechanical specifications

External dimensions	Product dimensions	(W) 320 x (D) 580 x (H) 1060 mm ∗ Latch unit and tray unit excluded.
	Packaged dimensions	(W) 1295 x (D) 680 x (H) 516 mm
Footprint		(W) 320 x (D) 580 mm ∗ Latch unit and tray unit excluded.
Weight	Product weight	Approx. 23kg
	Package weight	Approx. 32kg
Item enclosed	Inserter: 1	

2. Electrical specifications

| Input voltage	Supplied from the main unit DC+24V ± 10% DC +5V ± 5%
Power consumption	DC+24V: 58.3W max. DC +5V: 1.1W max.

3. Environmental conditions

Operating conditions (normal operation)	Temperature	5 – 35°C
	Humidity	20 – 85%RH (No condensing)
Transport/storage environment	Temperature	–20 – 50°C
	Humidity	10 – 90%RH (No condensing)

4. Compliance

| Safety standard	UL: 60950 the 3rd edition C-UL: CAN/CSA-C22. 2 No.60950 the 3rd edition CE: EN60950 ITS (German GS mark)
Electromagnetic Compliance	VCCI: Class B FCC: Class B CE: EN50081-1 EN55024

[3] EXTERNAL VIEWS AND INTERNAL STRUCTURES

1. External components
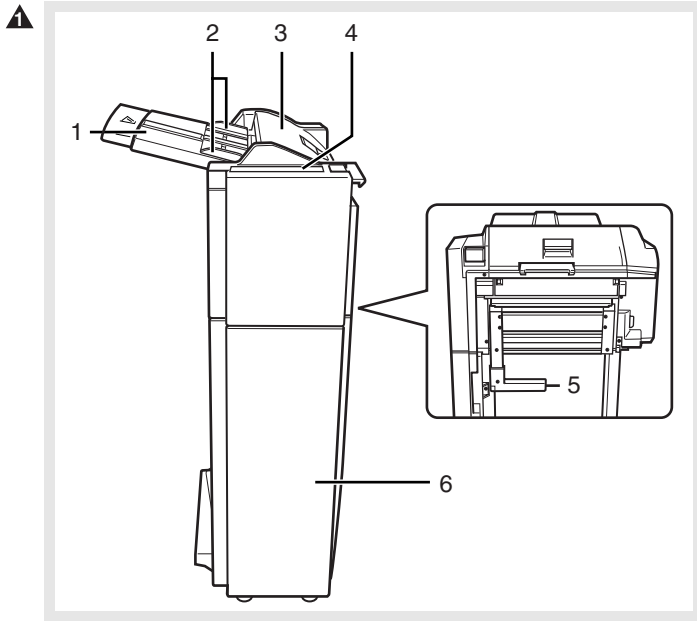
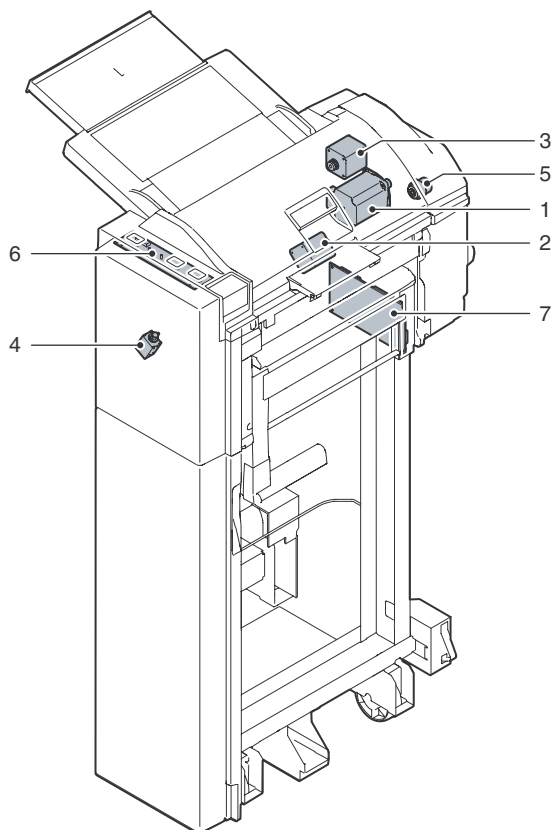| No.	Description	Function
1	Paper feed tray	Place blank or printed sheets to be inserted in this tray.
2	Paper guide	Adjust this guide according to the paper size.
3	Top cover	Open this cover to clear a paper jam.
⚠ 4	Operator panel	Used to staple and punch during off-line. (The same operation can be made with the operation panel of the main unit.)
⚠ 5	Paper guiding section (Lever)	Unlock the paper guiding section to clear a paper jam.
6	Front cover	Open this cover to remove jammed paper from the finisher or saddle finisher.

2. Sensors and switches
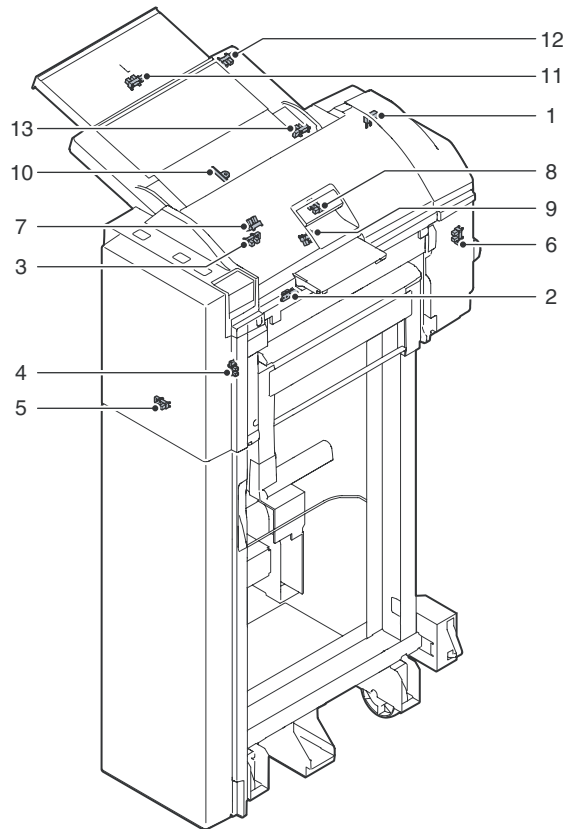
No.	Symbol	Description	Type	Function and operation	Output	Product name (Model)	Manufacturer
1	JCK_S W	JAM cover open/ close switch	Microswitch	Detects that the JAM cover is opened or closed.	When the JAM cover is opened, TP37 turns HIGH.	DE2L-FAAA	HIROSE CHERRY PRECISION
2	H_SEN	Reverse sensor	Reflective sensor	Detects that a sheet to be inserted is transported to the reverse sensor.	When a sheet is detected, TP1 turns HIGH.	SENSOR (SNS - SPI-337-01)	SANYO

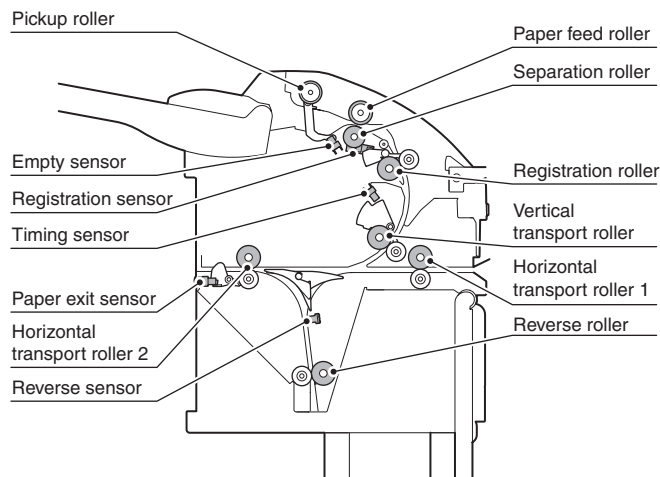| No.	Symbol	Description	Type	Function and operation	Output	Product name (Model)	Manufacturer
3	HI_SEN	Paper exit sensor	Photointerrupter	Detects that a sheet to be inserted is transported to the paper exit sensor.	When a sheet is detected, TP7 turns LOW.	TLP1241 (C5)	TOSHIBA
4	HYK_SEN	Reverse unit open/ close sensor	Photointerrupter	Detects that the reverse unit is opened or closed.	When the reverse unit is opened, TP9 turns LOW.	TLP1241 (C5)	TOSHIBA
5	KC_SEN	Stand cover open/ close sensor	Photointerrupter	Detects that the stand cover is opened or closed.	When the stand cover is opened, TP10 turns LOW.	TLP1241 (C5)	TOSHIBA
6	S_SEN	Set sensor	Photointerrupter	Detects that the inserter is joined to the main unit.	When the inserter is joined to the main unit, TP16 turns HIGH.	TLP1241 (C5)	TOSHIBA
7	EMP_SEN	Empty sensor	Photointerrupter	Detects presence/absence of a sheet to be inserted in the paper feed tray.	When a sheet is detected, TP4 turns HIGH.	TLP1241 (C5)	TOSHIBA
8	REG_SEN	Registration sensor	Photointerrupter	Detects that a sheet to be inserted is transported to the registration sensor.	When a sheet is detected, TP5 turns LOW.	TLP1241 (C5)	TOSHIBA
9	TIM_SEN	Timing sensor	Photointerrupter	Detects that a sheet to be inserted is transported to the timing sensor.	hen a sheet is detected, TP6 turns LOW.	TLP1241(C5)	TOSHIBA
10	T_VR	Sheet width detection potentiometer	Potentiometer	Detects the width of a sheet to be inserted in the tray.	The voltage of TP12 varies between 0 V and 5 V depending on the sheet width.	RDC505003A	ALPS
11	T_SEN	Tray sensor	Photointerrupter	Detects the length of a sheet to be inserted in the tray	When a sheet is detected, TP13 turns LOW.	GP1A73A	SHARP
12	TH_SEN	Sub tray pullout detection sensor	Photointerrupter	Detects the pullout status of the sub tray.	When the pullout status is detected, TP14 turns LOW.	GP1A73A	SHARP
13	TS_SEN	Sub tray retraction detection sensor	Photointerrupter	Detects the retracted status of the sub tray.	When the retracted status is detected, TP15 turns LOW.	GP1A73A	SHARP

3. Motors, solenoid, and clutch

No.	Symbol	Description	Function	Product name (Model)	Manufacturer
1	K_MOT	Paper feed motor	Feeds a sheet to be inserted from the tray.	23KM-K112-P5V	MINEBEA
2	H_MOT	Reverse motor	Reverses and ejects a sheet to be inserted.	17PM-J507-P2VS	MINEBEA
3	Y_MOT	Horizontal transport motor	Transports a sheet to be inserted on the horizontal transport path.	17PM-J507-P3VS	MINEBEA
4	F_SOL	Flapper solenoid	Switches over the flapper in the reversing operation.	TDS-10SL-134	TDS
5	R_CL	Registration clutch	Holds the registration rollers to maintain registration.	BJ-2.6-184	SHINKO
6	PBA-PANEL	Operation panel PWB	–		
7	PBA-CONT	Main control PWB	–		

[4] OPERATIONAL DESCRIPTION

1. Structure

A. Cross-sectional view (Main body)

3. Operational description

A. Through-mode operation of inserter (Online)

Step 01: The inserter receives an operation command sent by the main unit.

Step 02: The transport motor rotates at a speed specified by the main unit.

Horizontal transport rollers 1 (inlet rollers) and horizontal transport rollers 2 (paper exit rollers) rotate.

Step 03: A sheet exits from the main unit.

Step 04: The paper exit sensor detects the leading edge of the sheet.

B. Drive system

[List of actuators]

Actuator		Components to be driven
Description	Type	
Paper feed motor	Pulse motor	Pickup roller, feed rollers, separation rollers, registration rollers, vertical transport rollers
Transport motor	Pulse motor	Inlet rollers (horizontal transport rollers 1), paper exit rollers (horizontal transport rollers 2)
Reverse motor	Pulse motor	Reverse rollers
Reverse flapper solenoid	Solenoid	Switch-over flapper in reverse section
Registration clutch	Electromagnetic clutch	Registration roller lock clutch

2. Function outline

A. Operation mode

(1) Normal (online mode)

• Through (horizontal transport)
• Straight mode (normal paper feeding from inserter)
• Reverse mode (reverse paper feeding from inserter)

(2) Offline mode

• Punching mode (inserter operation = normal paper feeding)
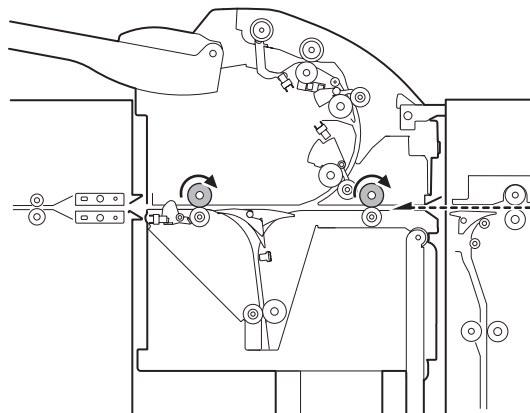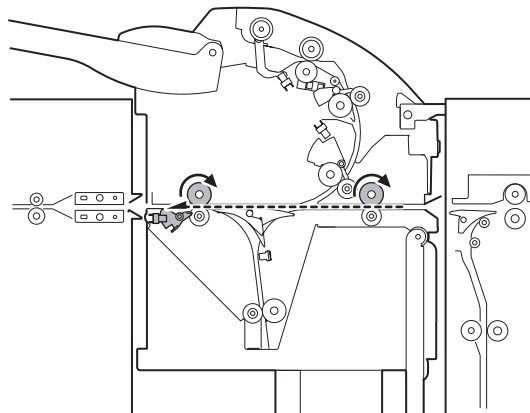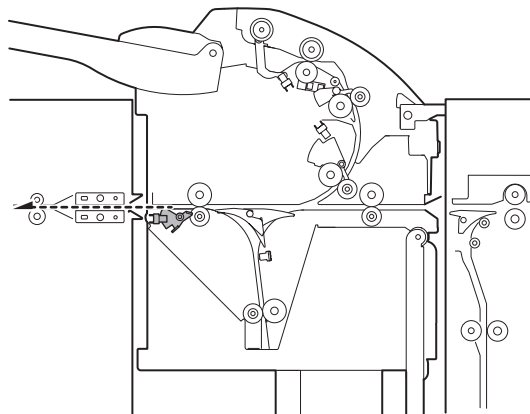• Stapling mode (inserter operation = normal paper feeding)

B. Delivery speed

(1) Delivery speed

⚠ • Straight mode: 800 mm/sec
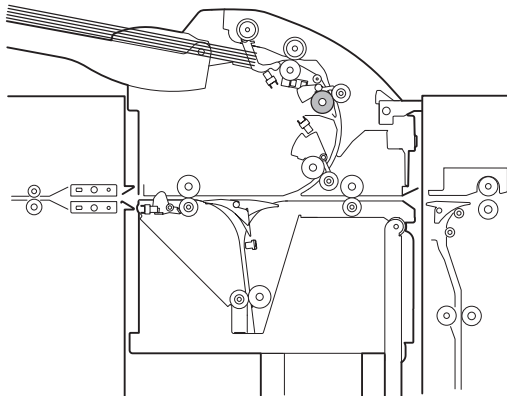• Saddle mode (reverse): 420 mm/sec

Step 05: The paper exit sensor detects the trailing edge the sheet.

Step 06: The transport motor stops.

Horizontal transport rollers 1 and horizontal transport rollers 2 stop.

B. Normal paper feed operation of inserter (online/offline)
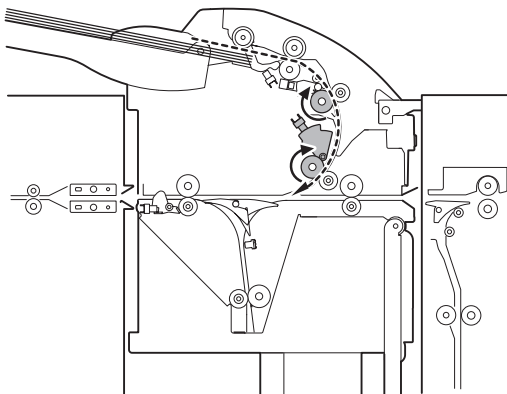
[Paper loading]

Step 01: A sheet is placed in the paper feed tray of the inserter.

Step 02: The START LED lights up in blue on the operator panel of the inserter.

Step 03: An operation command is sent by the main unit, or a user presses the START switch on the operator panel of the inserter.

Step 04: The registration clutch is turned ON to lock the registration rollers.
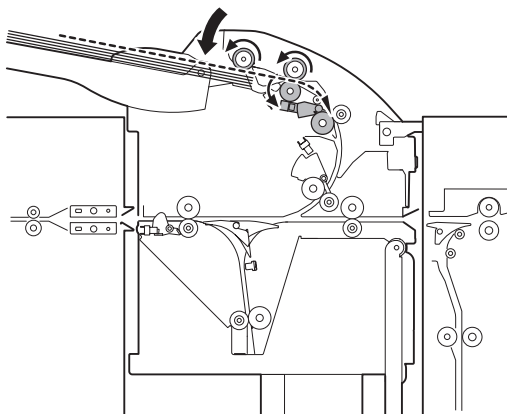
[Separation]

Step 05: The paper feed motor reverses to lower the pickup roller, thereby taking in the sheet from the paper feed tray.

Step 06: The registration sensor detects the leading edge of the sheet.

Step 07: The sheet makes contact with the registration rollers to form a loop, thereby stopping the paper feed motor.

Step 08: The registration clutch is turned OFF.

[Leading-edge registration]

Step 09: The paper feed motor starts to rotate in the forward direction. The registration rollers and vertical transport rollers rotate.

Step 10: The timing sensor detects the leading edge of the sheet.

Step 11: The leading edge of the sheet passes between the vertical transport rollers.

Step 12: When sheet transport needs to be suspended for adjusting the space between sheets, the paper feed motor stops to stop the sheet.

[Transport]
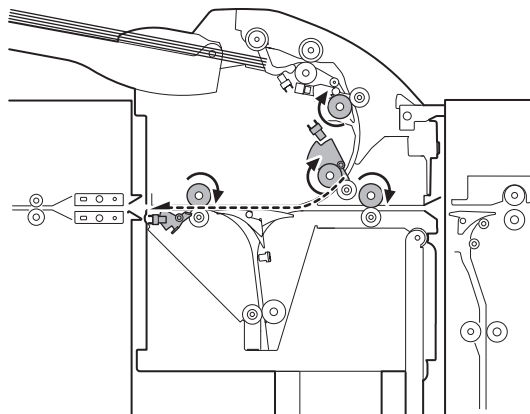
Step 13: When a predetermined waiting time period has passed, The paper feed motor restarts.

(If the transport motor has stopped, it is started.)

Step 14: The paper exit sensor is turned ON, and detects the leading edge of the sheet.

Step 15: The timing sensor is turned OFF, and the trailing edge of the sheet is detected.

Step 16: When the trailing edge of the sheet leaves the vertical transport rollers, the paper feed motor stops.

(When there is a next sheet to be inserted, the paper feed motor reverses to take it in.

[Paper exit]
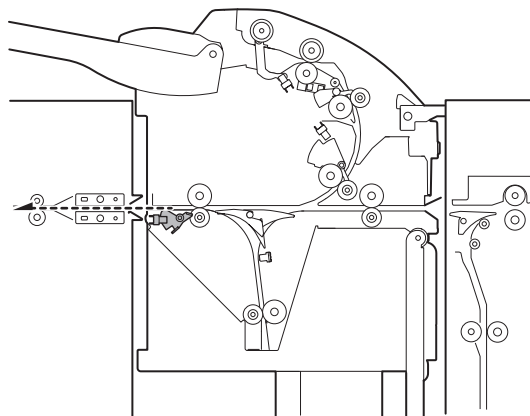
Step 17: The paper exit sensor is turned OFF, and the trailing edge of the sheet is detected.

Step 18: When there is no next sheet to be inserted, the transport motor stops.

Note: While the transport motor (horizontal transport rollers 1 and horizontal transport rollers 2) rotates at a speed specified by the main unit in the online mode, it rotates at either of the speeds shown below in the offline mode.

∗ Transport speed in offline mode
Small-sized sheet (of which length detected in the tray is 216 mm or less): 1000 mm/sec
Large-sized sheet (of which length detected in the tray is more than 216 mm): 800 mm/sec

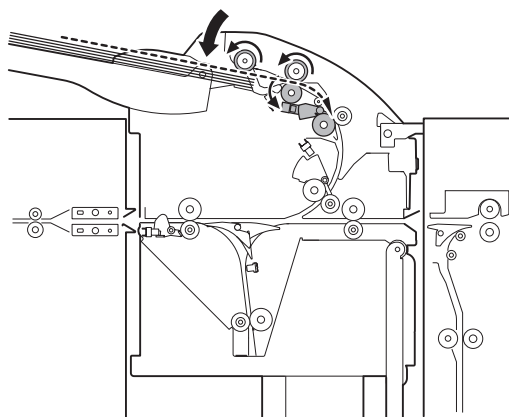## ⚠ C. Reverse paper feeding operation of inserter

[Paper loading]
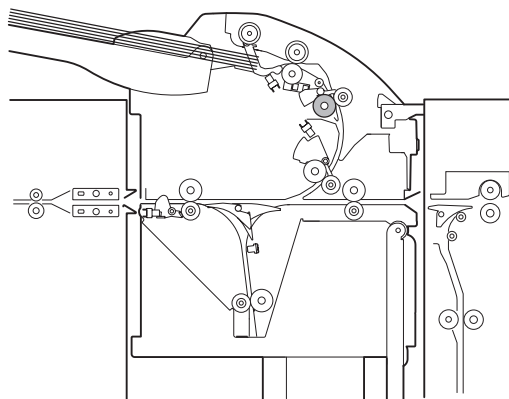
Step 01: A sheet is placed in the paper feed tray of the inserter.

Step 02: The START LED lights up in blue on the operator panel of the inserter.

Step 03: The inserter reserves an operation command sent by the main unit.

Step 04: The registration clutch is turned ON to lock the registration rollers.
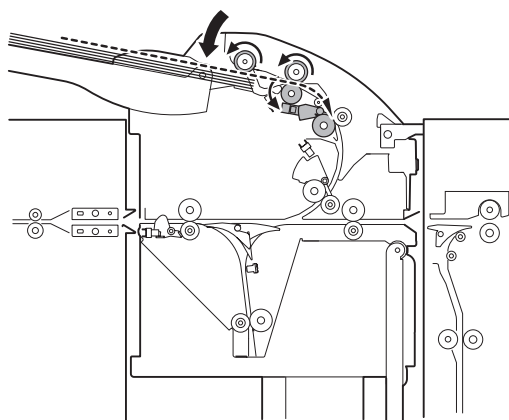
[Separation]

Step 05: The paper feed motor reverses to lower the pickup roller, thereby taking in the sheet from the paper feed tray.

Step 06: The registration sensor detects the leading edge of the sheet.

Step 07: The sheet makes contact with the registration rollers to form a loop, thereby stopping the paper feed motor.

Step 08: The registration clutch is turned OFF.

[Leading-edge registration]

Step 09: The paper feed motor starts to rotate in the forward direction. The registration rollers and vertical transport rollers rotate. If the sheet is the first sheet, the flapper solenoid in the reverse section is turned ON at this point of time.

Step 10: The timing sensor detects the leading edge of the sheet.

Step 11: The leading edge of the sheet passes between the vertical transport rollers.

Step 12: When sheet transport needs to be suspended for adjusting the space between sheets, the paper feed motor stops to stop the sheet.

[Entering reverse section]
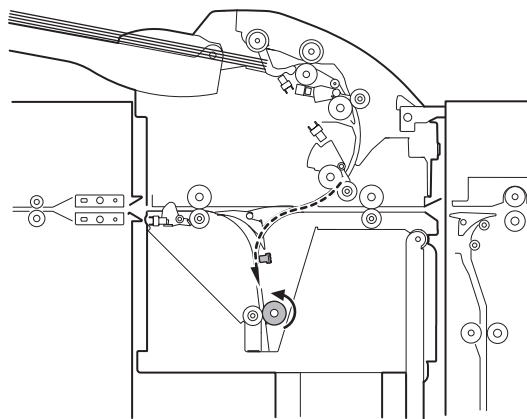
Step 13: When a predetermined waiting time period has passed, the flapper solenoid is turned ON, the paper feed motor restarts, and the reverse motor starts to rotate in the forward direction.

Step 14: The reverse sensor is turned ON, and detects the leading edge of the sheet.

Step 15: When the trailing edge of the sheet leaves the timing sensor, the paper feed motor starts to slow down to stop.
(After the paper feed motor has completely stopped, if there is a next sheet to be inserted, the paper feed motor starts to reverse to take it in.)
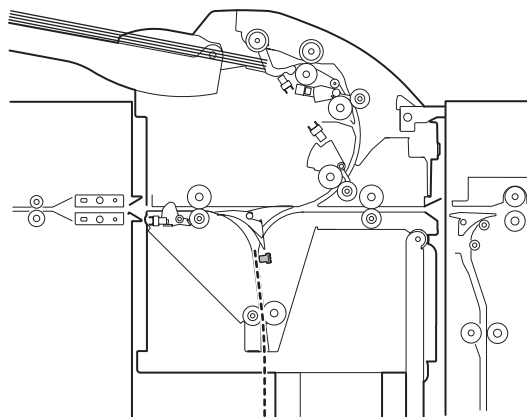
Step 16: The reverse sensor is turned OFF. The trailing edge of the sheet is detected, and the flapper solenoid in the reverse section is turned OFF. When the sheet travels a predetermined distance, the reverse motor stops.

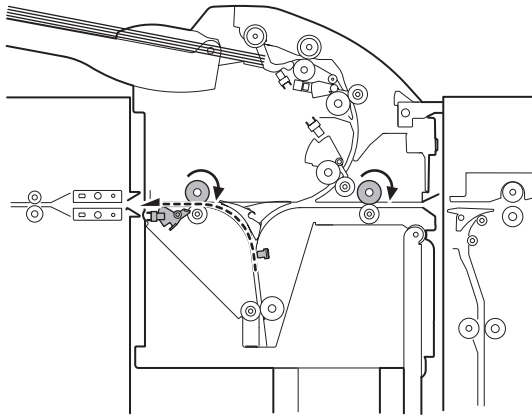## [Exiting from reverse section]
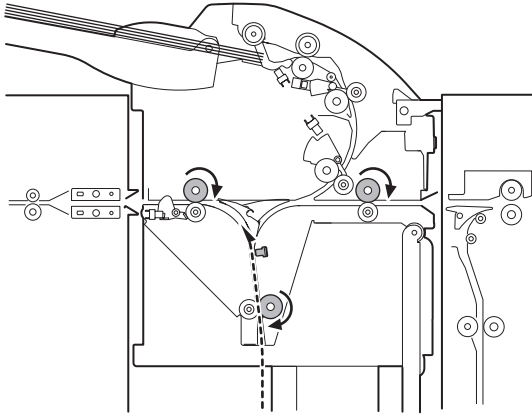
Step 17: When the reverse motor has completely stopped, the reverse motor starts to reverse, and the transport motor starts.

Step 18: The reverse sensor is turned ON, and detects the leading edge of the sheet.

Step 19: The paper exit sensor is turned ON, and detects the leading edge of the sheet.

Step 20: The reverse sensor is turned OFF. When the sheet travels a predetermined distance after its trailing edge is detected, the reverse motor stops.
(If the next sheet waits at the leading-edge registration position, the flapper solenoid in the reverse section is turned ON, the paper feed motor starts to rotate in the forward direction, and the reverse motor starts to rotate in the forward direction.)
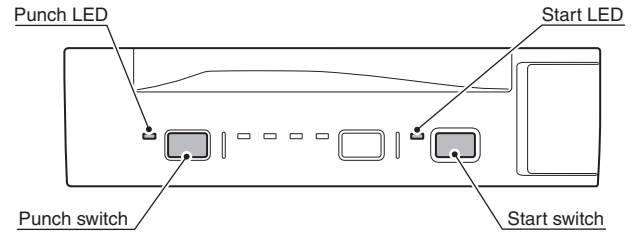
[Paper exit]
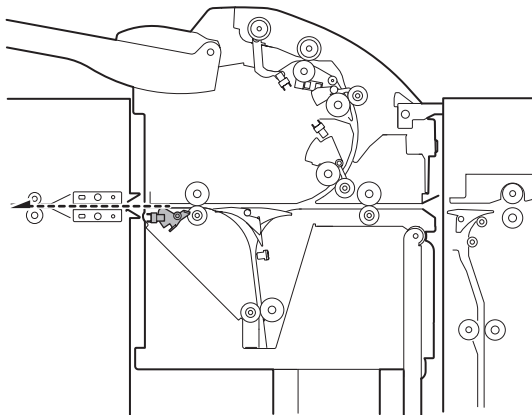
Step 21: The paper exit sensor is turned OFF, and the trailing edge of the sheet is detected.

Step 22: If there is no next sheet to be inserted, the transport motor stops.

4. Offline mode setting

A. How to set punching mode

The figure below shows the operator panel.

Setting procedure:

Step 01: Place a sheet in the tray.

Step 02: Press the PUNCH switch on the operator panel.

Step 03: The PUNCH LED lights up to indicate that setting has been completed.

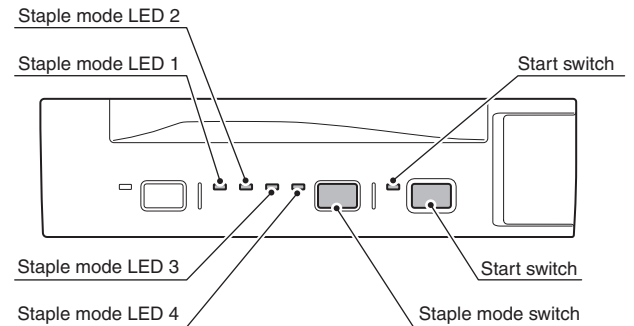Step 04: Press the START switch to start operation.

Canceling procedure:

Step 01: Press the PUNCH switch on the operator panel.

Step 02: The PUNCH LED goes out to indicate that setting has been canceled.

Note: If you cannot make or cancel setting by following the respective procedures above, refer to "5. LED indication on operation panel" shown later. When no LEDs are lit, check the setting made by the main unit and the inserter status.

B. How to set stapling mode

Setting procedure:

Step 01: Place a sheet in the tray.

Step 02: Press the STAPLE MODE switch on the operator panel.

Step 03: Each time you press the switch, the STAPLE MODE LEDs light up by turns in the following order: 1 → 2 → 3 → 4 → All LEDs OFF → 1 → ... (When the saddle mode is cannot be used, the order is: 1 → 2 → 3 → All LEDs OFF → 1 → ...)

Step 04: When the desired LED lights up, press the START switch to start operation.

(Refer to the correspondence between the stapling modes and LEDs shown later.)

Canceling procedure:

Step 01: Press the STAPLE MODE switch on the operator panel.

Step 02: All the STAPLE MODE LEDs go out to indicate that setting has been canceled.

Note 1: If you cannot make or cancel setting by following the respective procedures above, refer to "5. LED indication on operation panel" shown later. When no LEDs are lit, check the setting made by the main unit and the inserter status.

Note 2: The punching mode and saddle mode cannot be used at the same time.

The correspondence between the punching/stapling mode settings and LEDs is shown below.

Punch LED	Staple mode LEDs				Stapling mode
	LED1	LED2	LED3	LED4	
❍	●	❍	❍	❍	1-point stapling at back
❍	❍	●	❍	❍	2-point stapling
❍	❍	❍	●	❍	1-point stapling at front
❍	❍	❍	❍	●	Saddle stapling (saddle stitching)
●	❍	❍	❍	❍	Punching
●	●	❍	❍	❍	Punching + 1-point stapling at back
●	❍	●	❍	❍	Punching + 2-point stapling
●	❍	❍	●	❍	Punching + 1-point stapling at front

∗ ●: means "Lit."

5. LED indication on operator panel

Status	Cause	Explanation	START LED		MODE LED
			Red	Green	
Empty tray					The selected MODE LED is lit.
	Inserter problem				
	Finisher problem				
	Paper jam in inserter		Lit		The LED of the selected mode is lit.
	Paper jam in finisher		Lit		The LED of the selected mode is lit.
	Inserter alarm				The LED of the selected mode is lit.
	Finisher alarm				The LED of the selected mode is lit.
	Open inserter cover				The LED of the selected mode is lit.
	Open finisher cover				The LED of the selected mode is lit.
	Offline operation disabled				
	Inserter tray specified stapling mode non-usable Punching non-usable				The LED of the selected mode is lit.
	Operation mode Stapling disabled Punching disabled				The LED of the selected mode is blinking.
	Full tray (considered as a kind of finisher alarms)				The LED of the selected mode is lit.
	Other				
Paper-loaded tray (Operable)				Lit	The LED of the selected mode is lit.
Paper-loaded tray(Non-operable)	Inserter problem		Lit		
	Finisher problem		Lit		The LED of the selected mode is lit.
	Paper jam in inserter		Lit		
	Paper jam in finisher		Lit		The LED of the selected mode is lit.
	Inserter alarm		Blinking		The LED of the selected mode is lit.
	Finisher alarm		Blinking		The LED of the selected mode is blinking.
Paper-loaded tray (Non-operable)	Open inserter cover				The LED of the selected mode is lit.
	Open finisher cover				The LED of the selected mode is lit.
	Incompatible paper size	A non-usable paper size "A4 lateral," etc. is added when the saddle mode is selected: Extra size	Blinking		The LED of the selected mode is lit.
	Offline operation disabled				
	Inserter tray specified stapling mode non-usable Punching non-usable	The selected mode is non-usable.			The LED of the selected mode is blinking.
	Operation mode Stapling disabled Punching disabled	The selected mode is disabled.			The LED of the selected mode is blinking.
	Full tray (considered as a kind of finisher alarms)	The tray corresponding to the selected mode is full.	Blinking		The LED of the selected mode is blinking.
	Over loaded		Blinking		The LED of the selected mode is blinking.
	Paper loaded in the finisher intermediate process tray		Blinking		The LED of the selected mode is lit.
	Other	Main unit status "operation disabled," finisher status "non-operable," etc.			The LED of the selected mode is lit.
Waiting for start of offline operation		After a user presses the START switch		Blinking	The LED of the selected mode is lit.
In offline operation				Blinking	The LED of the selected mode is lit.

Note: For LED status, each blank means "not lit."

6. Paper jam/error detection

A. List of Paper jams

Description	Detection timing	Explanation
Not arrived at registration sensor	At a time of separating a sheet	A paper jam is detected if the registration sensor is not turned ON, which means absence of a sheet, even when the paper feed motor has been driven for a fixed distance after the pickup roller starts to lower.
Not arrived at timing sensor	At a time of leading-edge registration	A paper jam is detected if the timing sensor is not turned ON, which means absence of a sheet, even when the registration rollers (paper feed motor) have been driven for a fixed distance after they are started.
Not arrived at paper exit sensor	At a time of paper exit in through mode	A paper jam is detected if the paper exit sensor is not turned ON by the leading edge of a sheet, which means absence of a sheet, even when the transport motor has been driven for a fixed distance after the main unit sends a paper exit command.
	At a time of paper exit in normal paper feed mode	A paper jam is detected if the paper exit sensor is not turned ON, which means absence of a sheet, even when the leading edge of a sheet has traveled a fixed distance after it reaches the paper exit rollers (horizontal transport rollers 2).
	At a time of paper exit in reverse paper feed mode	A paper jam is detected if the paper exit sensor is not turned ON, which means absence of a sheet, even when a sheet has been transported a fixed distance by the transport motor after the reverse sensor is turned ON, which means presence of a sheet.
Not arrived at reverse sensor	At a time of entering reverse section	A paper jam is detected if the reverse sensor is not turned ON, which means absence of a sheet, even when the reverse motor has been driven for a fixed distance after leading-edge registration.
	At a time of exiting from reverse section	A paper jam is detected if the reverse sensor is turned ON, which means absence of a sheet, even when the reverse motor has been driven for a fixed distance while a sheet is exiting from the reverse section.
Stay at registration sensor	At a time of paper exit in normal paper feed mode	A paper jam is detected if the registration sensor is not turned OFF, which means presence of a sheet, even when the paper feed motor has been driven for a predetermined amount after a sheet reaches the starting position of leading-edge registration.
	At a time of entering reverse section in reverse paper feed mode	
Stay at timing sensor	At a time of paper exit in normal paper feed mode	A paper jam is detected if the timing sensor is not turned OFF, which means presence of a sheet, even when the paper feed motor has been driven for a fixed distance after the registration sensor is turned OFF, which means absence of a sheet.
	At a time of entering reverse section in reverse paper feed mode	
Stay at paper exit sensor	At a time of paper exit in through mode	A paper jam is detected if the paper exit sensor is not turned OFF, which means presence of a sheet, even when the transport motor has been driven for a predetermined amount after the paper exit sensor is turned ON, which means presence of a sheet.
	At a time of paper exit in normal paper feed mode	A paper jam is detected if the paper exit sensor is not turned OFF, which means presence of a sheet, even when the transport motor has been driven for a fixed distance after the trailing edge of a sheet reaches the paper exit rollers (horizontal transport rollers 2).
	At a time of paper exit in reverse paper feed mode	
Stay at reverse sensor	At a time of entering reverse section	A paper jam is detected if the reverse sensor is not turned OFF, which means presence of a sheet, even when the reverse motor has been driven for a fixed distance after the timing sensor is turned OFF, which means absence of a sheet.
	At a time of exiting from reverse section	A paper jam is detected if the reverse sensor is not turned OFF, which means presence of a sheet, even when the reverse motor has been driven for a predetermined amount after the reverse sensor is turned ON, which means presence of a sheet.

B. Error detection

(1) EEPROM errors

Explanation:

1) Timeout error

   The EEPROM is being programmed even after a predetermined time period (150 msec) has passed.

2) Writing error

   The written data does not match the read data even when writing and reading are retried.

3) Reading error

   Checking pieces of data read from three sources results in mismatch even when checking is retried.

(2) Reverse sensor adjustment error

Explanation:

1) When the DA output exceeds the upper limit

   Even when the DA output is increased, the AD input value does not fall within the appropriated range.

2) When the DA output is less than the lower limit

   Even when the DA output is decreased, the AD input value does not fall within the appropriated range.

C. Alarm detection

Explanation:

An alarm is issued because the size of a sheet in the tray cannot be correctly detected when both the sub tray pullout detection sensor and the sub tray retraction detection sensor are turned OFF.

Indication:

Shown by a LED on the operator panel of the inserter or of the main unit as an inserter alarm.

[5] ADJUSTMENTS

1. Paper width detection level setting (adjustment)

LED 6   LED 5   LED 4   LED 3   LED 2   LED 1

PUNCH key   Operator panel   STAPLE key   START key
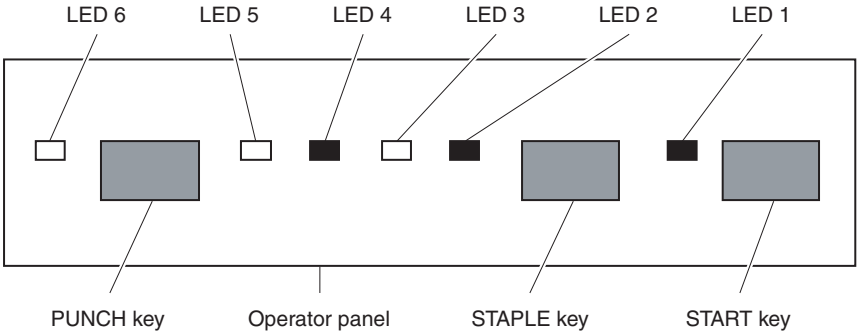
1) Enter the diag mode.

Press and hold PUNCH key and START key, and turn on the power of the main unit.

The LCD display of the main unit turns on and off, then turns on again.

Check that LED1 is flashing, and release PUNCH key and START key.

2) Press START key.

The display changes to the diag mode.

3) Press PUNCH key and STAPLE key to set to the paper width detection level setting (adjustment) mode.

The diag mode is displayed by combination of LED lighting.

■ : Lighting   □ : OFF

Diag mode No.	Diag mode	LED lighting
11	Paper width detection level setting (adjustment) mode	6 5 4 3 2 1 □ □ ■ □ ■ ■

4) Press START key. (The selected diag mode is executed.)

5) Check that LED2 is flashing, and set the paper guide to the max. width position.

6) Press START key.

7) Check that LED3 is flashing, and set the paper guide to A4R width position.

8) Press START key.

9) Check that LED4 is flashing, and set the paper guide to A5R width position.

10) Press START key.

11) Check that LED5 is flashing, and set the paper guide to the min. width position.

12) Press START key.

When setting (adjustment) is completed normally, LED1 lights up. When it is failed, LED1 flashes more rapidly.
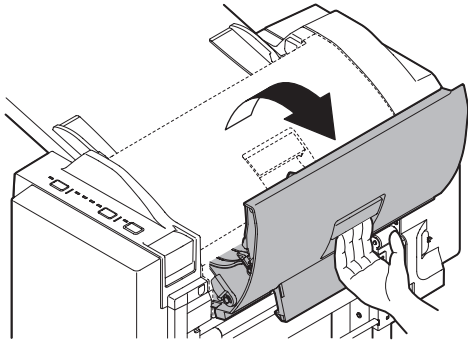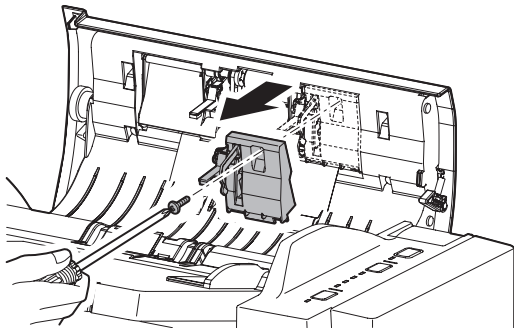
[6] DISASSEMBLY AND ASSEMBLY

1. Paper Feed Separation Unit

A. Pickup Roller & Paper Feed Roller
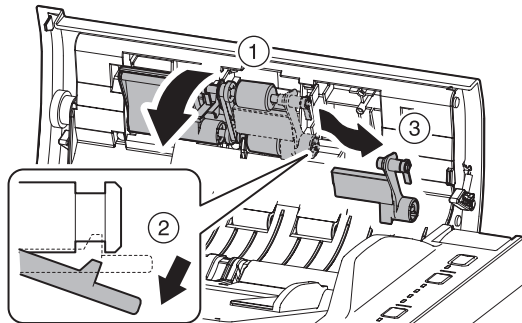
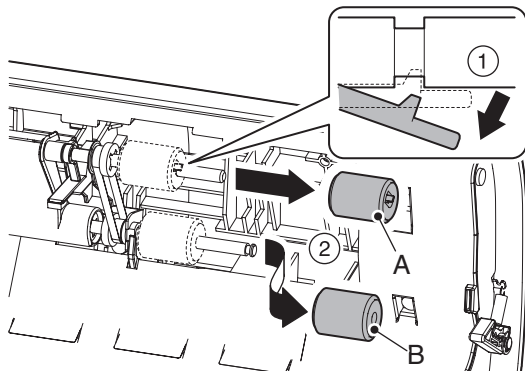1) Open the top cover

2) Remove the maintenance cover.

3) Turning the paper feed unit, remove the paper feed roller guide.
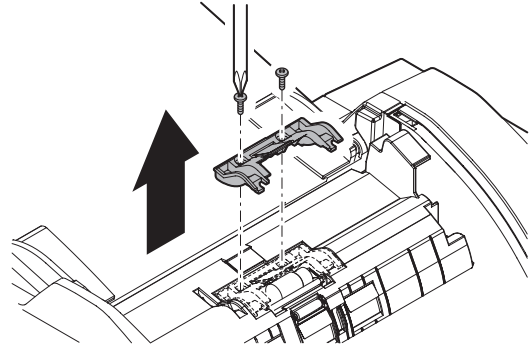
4) Remove the pickup roller and paper feed roller.
   A: Pickup roller
   B: Paper feed roller

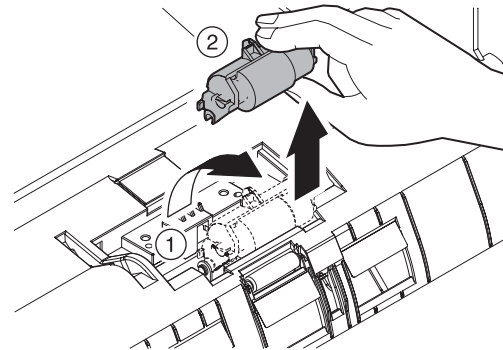### B. Torque Limiter & Separation Roller

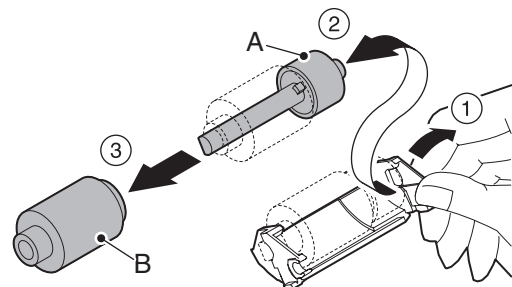1) Open the top cover.
2) Remove the maintenance cover.

3) Turn the separation roller unit to remove.

4) Remove the torque limiter and the separation roller.
   A: Torque limiter
   B: Separation roller

2. Paper Feed Unit

A. Horizontal Pass Roller 1 and Registration Roller

1) Open the top cover.
2) Open the mount cover.
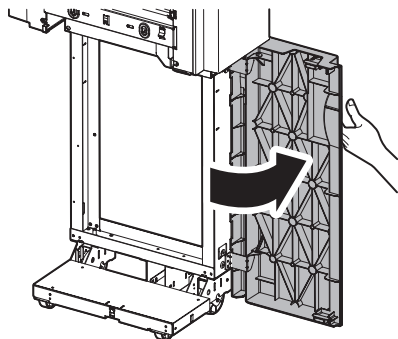
3) Remove the front cover.
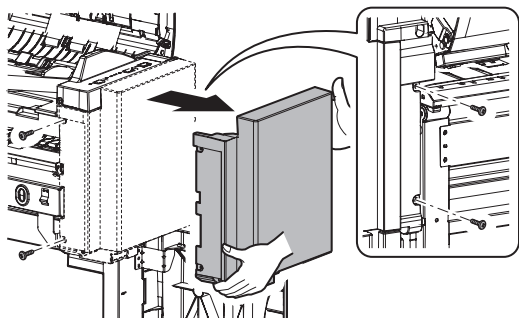
4) Remove the rear cover.
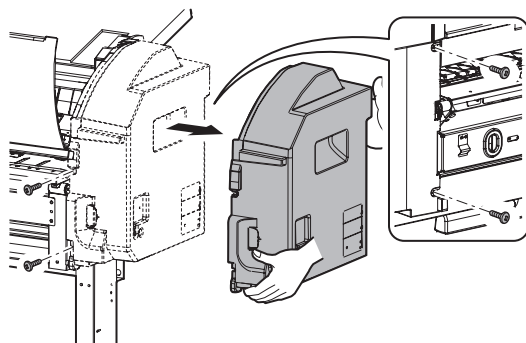
▲ 5) Remove the open/close cover fulcrum and two E-rings (F/R), and remove the upper door section.
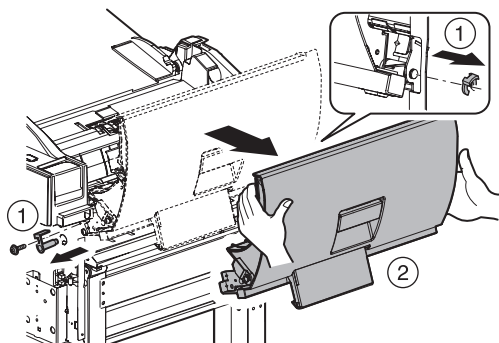
A: Horizontal pass roller 1
B: Registration roller
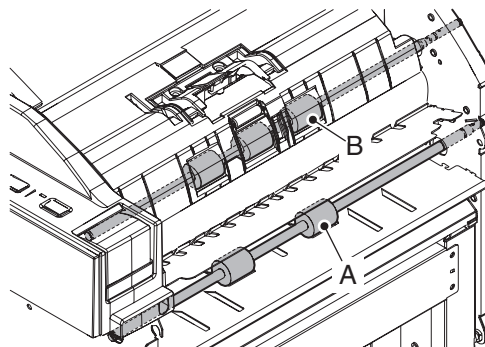
B. Horizontal Pass Roller 2 and Timing Roller

1) Open the top cover.
2) Remove the front cover and rear cover.
3) Disconnect the connector to remove the operating unit.
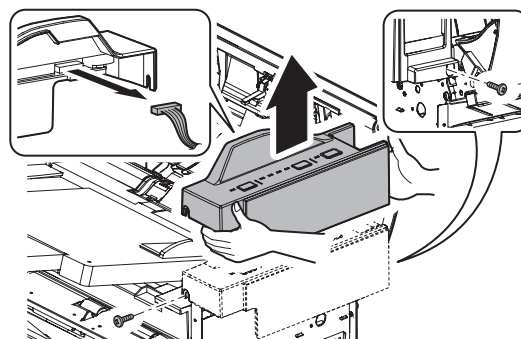
4) Disconnect the connector, tray support and tray spring guide spindle to remove the tray unit.
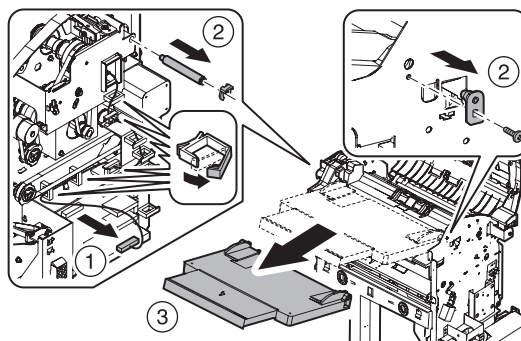
5)   Remove the finisher latch cover.
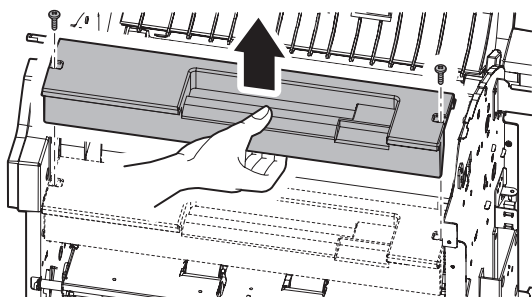
A: Horizontal pass roller 2

B: Timing roller
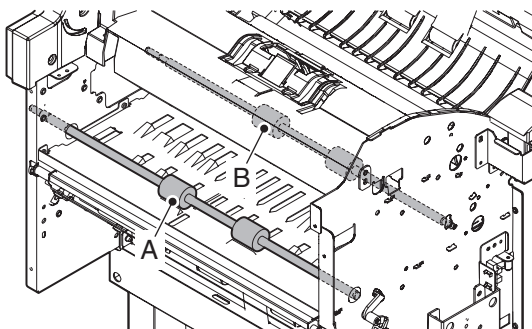
C. Reverse Roller

1)   Open the top cover.

2)   Remove the front cover and rear cover.

3)   Remove the finisher fixing bolt to remove the finisher positioning stay unit.
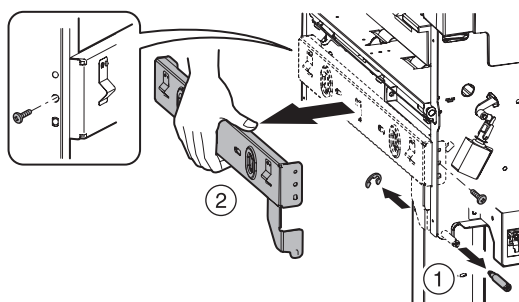
⚠ 4)   Remove the reverse supports and E-rings to remove the reverse unit.
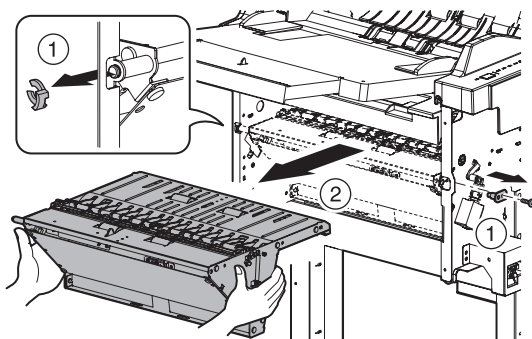
5)   Remove the cover bracket.
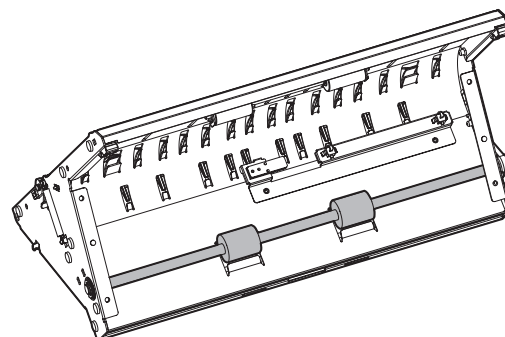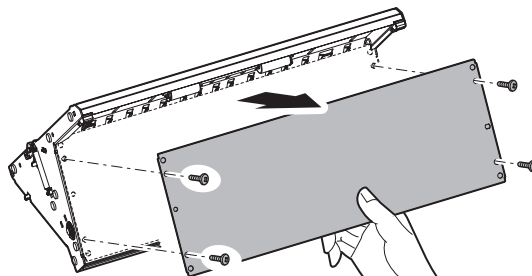
D. Paper Guide
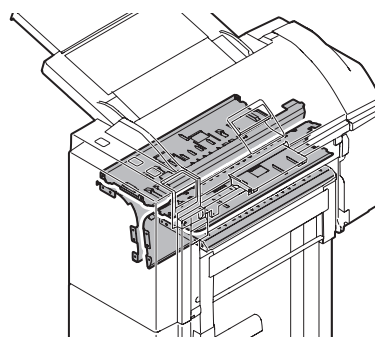
3. Drive Unit

A. Belts

1) Open the top cover.
2) Remove the rear cover.
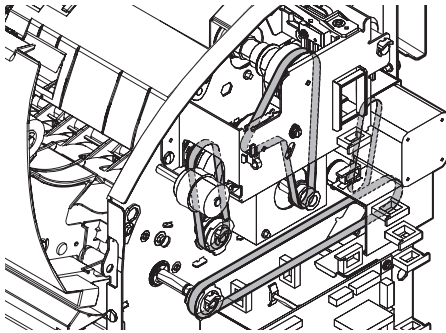
B. Gears

1) Open the top cover.
2) Remove the rear cover.
3) Disconnect the connector to remove the drive unit.
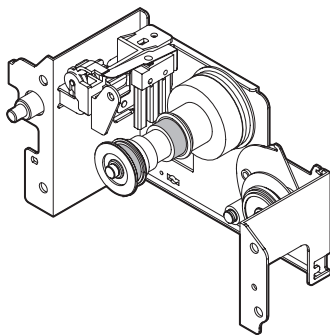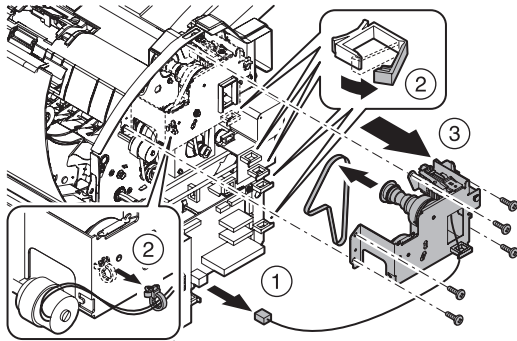
4. Other Parts

A. Sensors
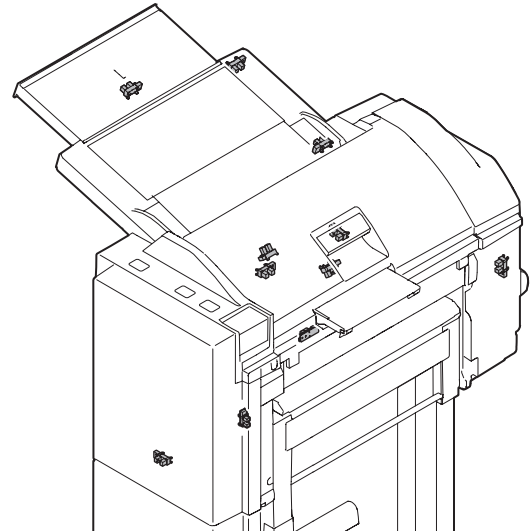
5. Note on assembly

A. Reverse flapper solenoid adjustment

1) Rotate the solenoid lever (LVR-FM-SOL) fully clockwise.
2) Adjust the position of the bracket (BKT-FM-SOL) of the solenoid so that the solenoid's arm is completely retracted (that there is no clearance in the rubber spacer, the stopper E-ring, and the main unit of the solenoid). When adjusted, fix the bracket with screws.

LVR-FM-SOL
Stopper E-ring
Rubber spacer
Solenoid main unit
Screw
BKT-FM-SOL
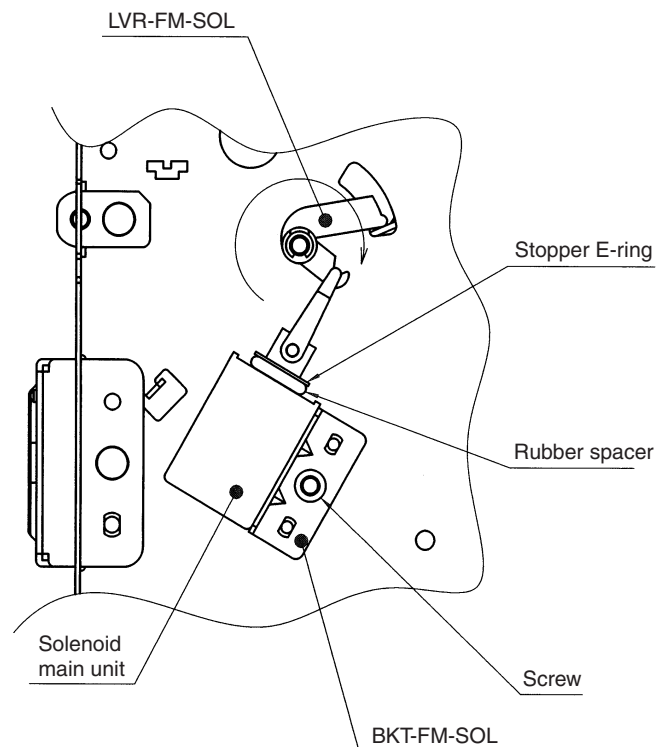
[7] MAINTENANCE

1. Maintenance list

✕ Check ❍ Cleaning ▲ Replace △ Adjust ☆ Lubricate ❏ Move position
(Clean, replace, and adjust, if necessary.)

		AR-M550U/M550N (PM: 250K)	When calling	250K	500K	750K	1000K	1250K	1500K	1750K	2000K	Remarks
		AR-M620U/M620N (PM: 300K)		300K	600K	900K	1200K	1500K	1800K	2100K	2400K	
Unit name	No.	Part name										
Paper separate section	1	Pickup roller / Paper feed rollers	✕	❍	❍	❍	❍	❍	❍	❍	❍	(Note)
	2	Torque limiter	✕	✕	✕	✕	✕	✕	✕	✕	✕	(Note)
Transport section	3	Transport rollers	✕	❍	❍	❍	❍	❍	❍	❍	❍	
	4	Transport paper guides	❍	❍	❍	❍	❍	❍	❍	❍	❍	
Drive section	5	Gears and their related parts	✕	☆	☆	☆	☆	☆	☆	☆	☆	(Specified positions)
	6	Belts		✕	✕	✕	✕	✕	✕	✕	✕	
Others	7	Sensors	✕	✕	✕	✕	✕	✕	✕	✕	✕	

(Note) Reference for replacement: Replace referring to the counter value at the paper entry of the inserter.

Paper feed roller and its related parts: 150K or one year

Torque limiter: 400K
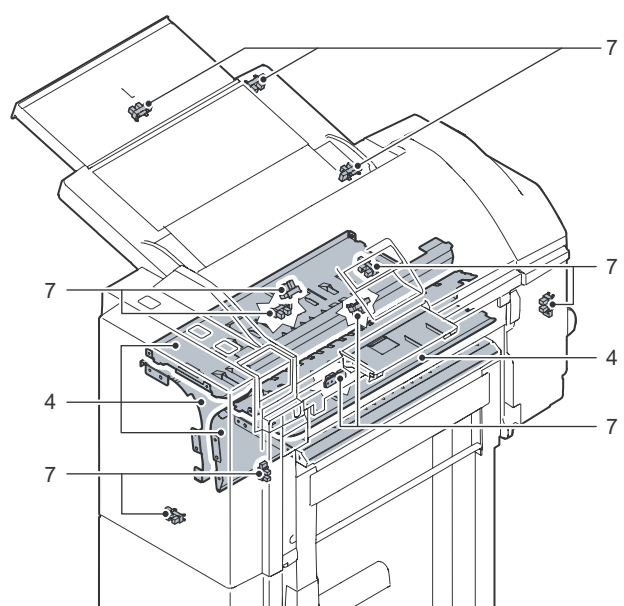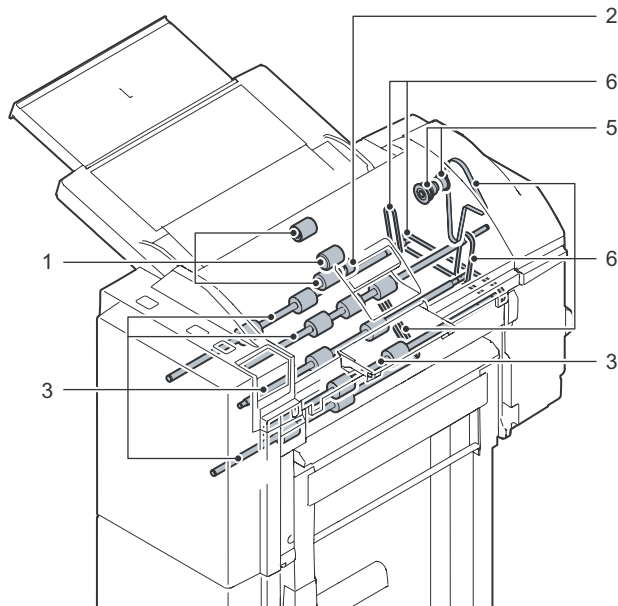
[8] TROUBLESHOOTING

Problem	**The inserter does not perform at all when the main switch of the main unit is turned ON.**	
Case1	Cause	Loose contact with the main unit
	Check and remedy	Check that each connector is firmly connected.
Case2	Cause	Loose contact of the connector terminal of the wire (interface harness) connecting with the main unit
	Check and remedy	Check continuity in between the connector terminals. Replace the connection wire if no continuity is measured
Case3	Cause	JAM cover open/close switch fault
	Check and remedy	Check continuity between the switch contacts., Replace the contacts if no continuity is measured.
Case4	Cause	Controller PCB fault
	Check and remedy	Check that 24 V DC and 5 V DC are supplied from the main unit after the above cases 1 to 3 are confirmed. If 24 V and 5 V are not present at CN1-2 pin and IC5-32 pin on the PCB, replace the controller PCB.

Problem	**The paper feed motor does not operate.** **The reverse motor does not operate.** **The horizontal transport motor does not operate.**	
Case1	Cause	Loose contact of the motor connector terminal
	Check and remedy	Check continuity of the connector contacts.(CN1 to 3)
Case2	Cause	Disconnection of the motor coil
	Check and remedy	Check continuity between the connector terminals. Replace the connection wire if no continuity is measured.
Case3	Cause	Controller PCB fault
	Check and remedy	If the motor does not operate in the motor single operation mode, replace the controller PCB.

Problem	**The paper is delivered without being reversed in the reverse paper feed mode.**	
Case1	Cause	Connector terminal fault of the reverse solenoid
	Check and remedy	Check continuity of the connector contact.(CN4)
Case2	Cause	Disconnection of the solenoid coil
	Check and remedy	Inspect the coil for continuity. Replace the coil if no continuity is measured.
Case3	Cause	Controller PCB fault
	Check and remedy	If the solenoid does not perform in the solenoid single operation mode, replace the controller PCB.

Problem	**Paper jam is displayed on the system display.**	
Case1	Cause	Paper jam
	Check and remedy	Visual observation. Take out paper jams.
Case2	Cause	Reverse sensor fault
	Check and remedy	Measure a voltage of TP2 on the controller PCB and check that 3 to 3.6 V is observed when no paper is stacked, and that 1.5 V or less is observed when paper is stacked. Replace the sensor if the measured voltage exceeds these ranges.
Case3	Cause	Paper exit sensor fault
	Check and remedy	Measure a voltage of TP7 on the controller PCB and check that 5 V is observed when no paper is stacked, and that 1 V or less is observed when paper is stacked. Replace the sensor if the measured voltage exceeds these ranges.
Case4	Cause	Empty sensor fault
	Check and remedy	Measure a voltage of TP4 on the controller PCB and check that 1 V or less is observed when no paper is stacked, and that 5 V is observed when paper is stacked. Replace the sensor if the measured voltage exceeds these ranges.
Case5	Cause	Registration sensor fault
	Check and remedy	Measure a voltage of TP5 on the controller PCB and check that 5 V is observed when no paper is stacked, and that 1 V or less is observed when paper is stacked. Replace the sensor if the measured voltage exceeds these ranges.
Case6	Cause	Timing sensor fault
	Check and remedy	Measure a voltage of TP6 on the controller PCB and check that a 5 V is observed when no paper is stacked, and that 1 V or less is observed when paper is stacked. Replace the sensor if the measured voltage exceeds these ranges.
Case7	Cause	Controller PCB fault
	Check and remedy	If the problem is not solved with the sensors whose level changes when each is turned ON/OFF, replace the controller PCB.

Problem	**The machine does not detect the paper.**	
Case1	Cause	Tray sensor fault
	Check and remedy	Measure a voltage of TP13 on the controller PCB and check thatV is observed when no paper is stacked, and that 1 V or less is observed when paper is stacked. Replace the sensor if the measured voltage exceeds these ranges.
Case2	Cause	Controller PCB fault
	Check and remedy	If the problem is not solved with a change in the sensor level after the above case 1 is confirmed, replace the controller PCB.

Problem	**Tray alarm is displayed on the system display.**	
Case1	Cause	Sub-tray pulling detection sensor fault
	Check and remedy	Measure a voltage on TP14 on the controller PCB and check that 5 V is observed when the sub-tray is in place, and that 1 V or less is observed when the sub-tray is pulled out. Replace the sensor if the measured voltage exceeds these ranges.
Case2	Cause	Sub-tray pulling detection sensor fault
	Check and remedy	Measure a voltage of TP15 on the controller PCB and check that 5 V is observed when the tray is in place, and that 1 V or less is observed when the tray is pulled. Replace the sensor if the measured voltage exceeds these ranges.
Case3	Cause	Controller PCB fault
	Check and remedy	If the problem is not solved by a change in the sensor level after the above cases 1 and 2 are confirmed, replace the controller PCB.

Problem	**Cover open is displayed on the system display.**	
Case1	Cause	JAM cover open/close switch fault
	Check and remedy	Check continuity between the switch contacts., Replace the switch if no conduction is measured.
Case2	Cause	Reverse unit open/close sensor fault
	Check and remedy	Measure a voltage of TP9 on the controller PCB and check that 1 V or less is observed when the reverse unit is open, and that 5 V is observed when the reverse unit is closed. Replace the sensor if the measured voltage exceeds these ranges.
Case3	Cause	Rack cover open/close sensor fault
	Check and remedy	Measure the voltage of TP10 on the control PWB and check that it is 1V or less when the base cover is opened and 5V when closed. If the voltage is outside the above specifications, replace the sensor with a new one.
Case4	Cause	Controller PCB fault
	Check and remedy	If the problem is not solved by a change in the sensor level after the above cases 1 to 3 are confirmed, replace the controller PCB.

Problem	**Inserter unset is displayed on the system display.**	
Case1	Cause	Set sensor fault
	Check and remedy	Measure a voltage of TP16 on the controller PCB and check that 5 V is observed when the inserter is set, and that 1 V or less is observed when the inserter is not set. Replace the sensor if the measured voltage exceeds these ranges.
Case2	Cause	Controller PCB fault
	Check and remedy	If the problem is not solved by a change in the sensor level after the above case 1 is confirmed, replace the controller PCB.

Problem	**The registration clutch does not perform.**	
Case1	Cause	Loose contact of the clutch connector terminal
	Check and remedy	Check continuity of the connector contacts. (CN4)
Case2	Cause	Disconnection of the clutch coils
	Check and remedy	Inspect the coils for continuity. Replace the coils if no continuity is measured.
Case3	Cause	Controller PCB fault
	Check and remedy	If the clutch does not perform in the clutch single operation mode, replace the controller PCB.

[9] ELECTRICAL SECTION

1. Actual Wiring Chart

PF3090   PBA-CONT

BE: Blue
BN: Brown
BK: Black
RD: Red
YW: Yellow
WE: White
OE: Orange
GY: Gray
SB: Sky-blue
PK: Pink
VT: Violet

2. Circuit Description

A. Outline

This circuit controls paper feed, transport, reverse, and delivery.

This circuit consists of the following divisions: managing signals from the sensors, the switches, and the main unit; driving the motors, the solenoid, and the clutch; the CPU and associated circuits.

B. Block Diagram

C. Circuit Detail

(1) Communication Circuit

<1> TxD signal

Main Unit

Finisher

<2> RxD signal

Main Unit

Finisher

This circuit communicates with the main unit and the finisher.

TxD0 and TxD1 are data signals transmitted from the main unit and the finisher to the inserter. RxD0 and RxD1 are data signals transmitted from the inserter to the main unit and the finisher. Logical 1 is represented by +5V, and logical 0 is represented by 0V.

(2) Sensor Input Circuits

<1> Reverse Sensor (H_SEN)

H_SEN uses the reflective sensor integrated with an LED and a phototransistor.

The sensor detects a sheet between the sensor and the opposite reflector interrupting the light path.

The CPU (IC6-Pin94, 95, 96) output is transmitted to the sensor to light the LED through the D/A converter (IC13), the operational amplifier (IC15.2), and the transistor (Q1). Meanwhile the signal is transmitted to the CPU (IC6-Pin30) through the noise filters (R4, C2) and the comparator (IC1.1).

The signal input to the CPU follows the logic: "H" when a sheet is detected, "L" when not detected.

The analog signal is transmitted to CPU (IC-Pin105) through no comparator.

R1 and R10 divide the +5V voltage which is applied to the comparator as the reference voltage.

R13 is used to make the reference voltage have hysteresis.

Paper Exit Sensor

173901-8 CN11.6 +5V
173901-8 CN11.7 SGND
173901-8 CN11.8 HI_SEN

R39 160 DC+5V
RK73K2ASTD360J
+5V RK73K1JTD13KJ
R34 13K
R25 10K
RK73K1JTD10KJ
C9 1000pF GRM188B11H102KA01
IC10.1 HD74LV14AFP
TP7
HI_SEN

Reverse Unit Open/Closed Sensor

173901-6 CN12.1 +5V
173901-6 CN12.2 SGND
173901-6 CN12.3 HYK_SEN

R37 360 DC+5V
RK73K2ASTD360J
+5V RK73K1JTD13KJ
R32 13K
R21 10K
RK73K1JTD10KJ
C7 1000pF GRM188B11H102KA01
IC10.5 HD74LV14AFP
TP9
HYK_SEN

Chassis Cover Open/Closed Sensor

173901-6 CN12.4 +5V
173901-6 CN12.5 SGND
173901-6 CN12.6 KC_SEN

R41 360 DC+5V
RK73K2ASTD360J
+5V RK73K1JTD13KJ
R36 13K
R29 10K
RK73K1JTD10KJ
C11 1000pF GRM188B11H102KA01
IC10.6 HD74LV14AFP
TP10
KC_SEN

<2> Paper Exit Sensor (HI_SEN)

HI_SEN uses the photointerrupter integrated with an LED and a phototransistor.

The sensor detects a sheet with the lever actuator interrupting the light path of the photointerrupter.

The signal is transmitted to the CPU (IC6-Pin106) through the noise filters (R25,C9).

The signal input to the CPU follow the logic: "L" when a sheet is detected, "H" when not detected.

R39 is a current limiting resistor for the LED. R34 is a load resistor for the sensor.

<3> Reverse Unit Open/Closed Sensor (HYK_SEN)

HYK_SEN uses the photointerrupter integrated with an LED and a phototransistor.

The sensor detects state of the reverse unit with the lever actuator interrupting the light path of the photointerrupter.

The signal is transmitted to the CPU (IC6-Pin108) through the noise filters (R21,C7).

The signal input to the CPU follows the logic: "L" when the reverse unit is open, "H" when closed.

R37 is a current limiting resistor for the LED. R32 is a load resistor for the sensor.
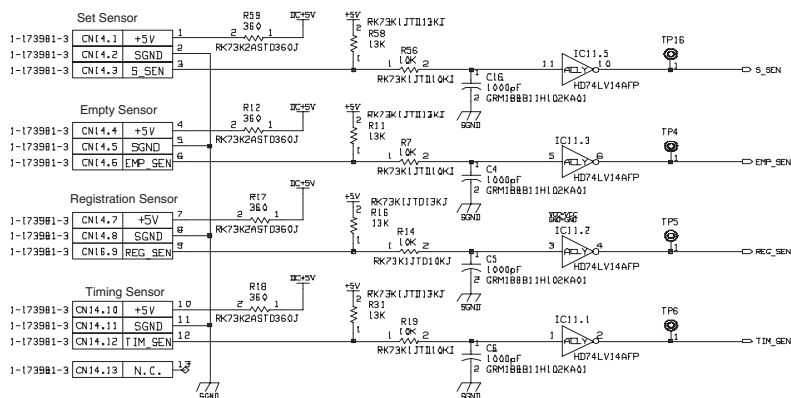
<4> Chassis Cover Open/Closed Sensor (KC_SEN)

KC_SEN uses the photointerrupter integrated with an LED and a phototransistor.

The sensor detects state of the chassis cover with the lever actuator interrupting the light path.

The signal is transmitted to the CPU (IC6-Pin109) through the noise filters (R29,C11).

The signal input to the CPU follows the logic: "L" when the chassis cover is open, "H" when closed.

R41 is a current limiting resistor for the LED. R36 is a load resistor for the sensor.

Set Sensor

1-173901-3 CN14.1 +5V
1-173901-3 CN14.2 SGND
1-173901-3 CN14.3 S_SEN

R59 360 DC+5V
RK73K2ASTD360J
+5V RK73K1JTD13KJ
R58 13K
R56 10K
RK73K1JTD10KJ
C16 1000pF GRM188B11H102KA01
IC11.5 HD74LV14AFP
TP16
S_SEN

Empty Sensor

1-173901-3 CN14.4 +5V
1-173901-3 CN14.5 SGND
1-173901-3 CN14.6 EMP_SEN

R12 360 DC+5V
RK73K2ASTD360J
+5V RK73K1JTD13KJ
R11 13K
R7 10K
RK73K1JTD10KJ
C4 1000pF GRM188B11H102KA01
IC11.3 HD74LV14AFP
TP4
EMP_SEN

Registration Sensor

1-173901-3 CN14.7 +5V
1-173901-3 CN14.8 SGND
1-173901-3 CN16.9 REG_SEN

R17 360 DC+5V
RK73K2ASTD360J
+5V RK73K1JTD13KJ
R16 13K
R14 10K
RK73K1JTD10KJ
C5 1000pF GRM188B11H102KA01
IC11.2 HD74LV14AFP
TP5
REG_SEN

Timing Sensor

1-173901-3 CN14.10 +5V
1-173901-3 CN14.11 SGND
1-173901-3 CN14.12 TIM_SEN
1-173901-3 CN14.13 N.C.

R18 360 DC+5V
RK73K2ASTD360J
+5V RK73K1JTD13KJ
R31 13K
R19 10K
RK73K1JTD10KJ
C6 1000pF GRM188B11H102KA01
IC11.1 HD74LV14AFP
TP6
TIM_SEN

<5> Set Sensor (S_SEN)

S_SEN uses the photointerrupter integrated with an LED and a phototransistor.

The sensor detects the main unit with the lever actuator interrupting the light path.

The signal is transmitted to the CPU (IC6-Pin2) through the noise filters (R56,C16).

The signal input to the CPU follows the logic: "H" when the inserter is connected to the main unit, "L" when not connected.

R59 is a current limiting resistor for the LED. R58 is a load resistor for the sensor.

<6> Empty Sensor (EMP_SEN)

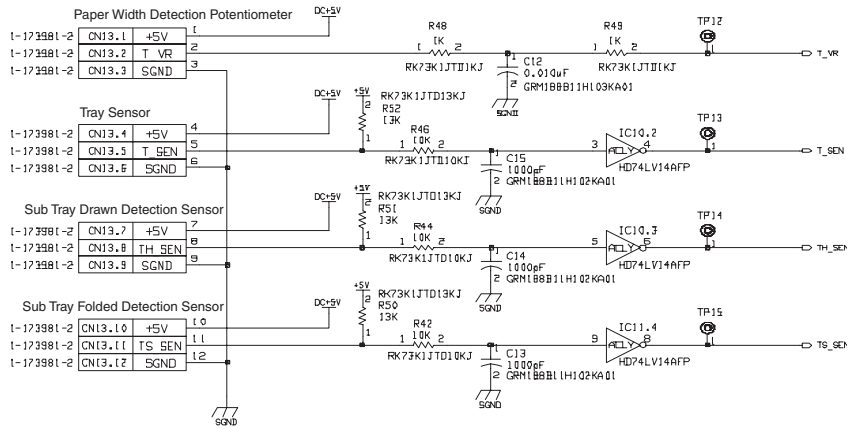EMP_SEN uses the photointerrupter including the LED and the phototransistor in one unit.

The sensor detects a sheet with the lever actuator interrupting the light path.

The signal is transmitted to the CPU (IC6-Pin31) through the noise filters (R7,C4).

The signal input to the CPU is the following logic: the signal is "H" when a sheet is detected, "L" when not detected.

R12 is the current limiting resistor for the LED. R11 is the load resistor for the sensor.

<7> Registration Sensor (REG_SEN)

REG_SEN uses the photointerrupter integrated with an LED and a phototransistor.

The sensor detects a sheet with the lever actuator interrupting the light path.

The signal is transmitted to the CPU (IC6-Pin32) through the noise filters (R14,C5).

The signal input to the CPU follows the logic: "L" when a sheet is detected, "H" when not detected.

R17 is a current limiting resistor for the LED. R16 is a load resistor for the sensor.

<8> Timing Sensor (TIM_SEN)

TIM_SEN uses the photointerrupter integrated with an LED and a phototransistor.

The sensor detects a sheet with the lever actuator interrupting the light path.

The signal is transmitted to the CPU (IC6-Pin33) through the noise filters (R19,C6).

The signal input to the CPU follows the logic: "L" when a sheet is detected, "H" when not detected.

R18 is a current limiting resistor for the LED. R31 is a load resistor for the sensor.

<9> Paper Width Detection Potentiometer (T_VR)

T_VR is a potentiometer.

The paper width is detected using the output voltage, which may vary depending on the potentiometer's knob position.

The signal is transmitted to the CPU (IC6-Pin112) through the noise filters (R48,C12).

<10> Tray Sensor (T_SEN)

T_SEN uses the photointerrupter integrated with an LED and a phototransistor.

The sensor detects a sheet with the lever actuator interrupting the light path.

The signal is transmitted to the CPU (IC6-Pin126) through the noise filters (R46,C15).

The signal input to the CPU follows the logic: "L" when a sheet is detected, "H" when not detected.

R52 is a load resistor for the sensor.

<11> Sub Tray Drawn Detection Sensor (TH_SEN)

TH_SEN uses the photointerrupter integrated with an LED and the phototransistor in one unit.

The sensor detects state of the sub tray with the lever actuator interrupting the light path.

The signal is transmitted to the CPU (IC6-Pin127) through the noise filters (R44,C14).

The signal input to the CPU follows the logic: "L" when the sub tray is drawn.

R51 is a load resistor for the sensor.

<12> Sub Tray Folded Detection Sensor (TS_SEN)

TS_SEN uses the photointerrupter integrated with an LED and a phototransistor.

The sensor detects state of the sub tray with the lever actuator interrupting the light path.

The signal is transmitted to the CPU (IC6-Pin128) through the noise filters (R42,C13).

The signal input to the CPU follows the logic: "L" when the sub tray is folded.

R50 is a load resistor for the sensor.

<13> JAM Cover Open/Closed Switch (JCK_SW)
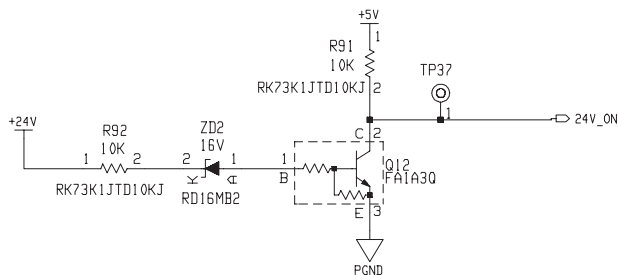
JCK_SW is the JAM cover open/closed detection switch using the microswitch.

+24V is supplied to the switch. The contacts open when the JAM cover is open.

When the switch turns on, +24V voltage is applied to the cathode of ZD2, the base current flows to Q12, and Q12 turns on to transmit the signal to the CPU (IC6-Pin111).
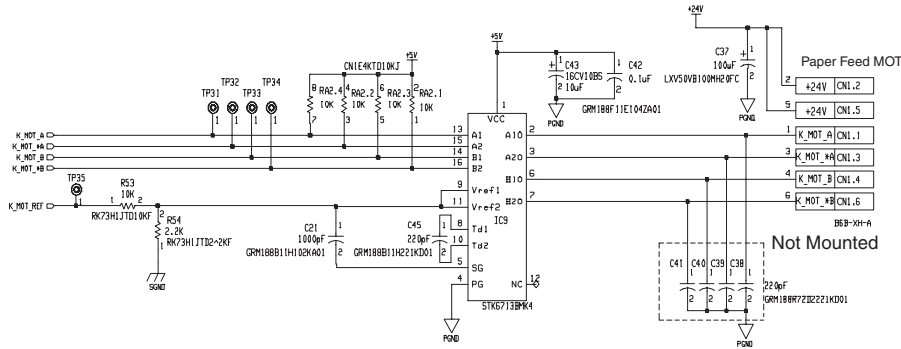
The signal is also used as the +24V conduction signal simultaneously.

The signal input to the CPU follows the logic: "H" when the JAM cover is open, "L" when closed.

The +24V conduction signal follows the logic: "L" when the +24V voltage is conducted.

(3) Motor Drive Circuits
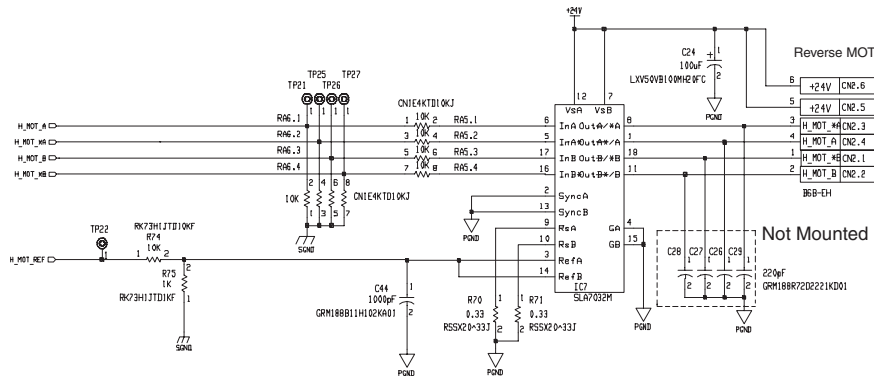
<1> Paper Feed Motor Drive Circuit (K_MOT)

This circuit rotates/stops K_MOT and controls its rotational direction and the motor current. The circuit consists of the CPU (IC6), the D/A converter (IC13), the constant-current chopper driver IC (IC9), and other elements.

The signals of the stepping-motor drive excitation pattern from the CPU (IC6-Pin37,38,70,71) control the motor rotation speed and rotational direction.

The analog signal from the D/A converter (IC13-Pin11) is divided into the constant voltage by R53 and R54. The divided voltage is applied to IC9-Pin9,11 to set the motor current.
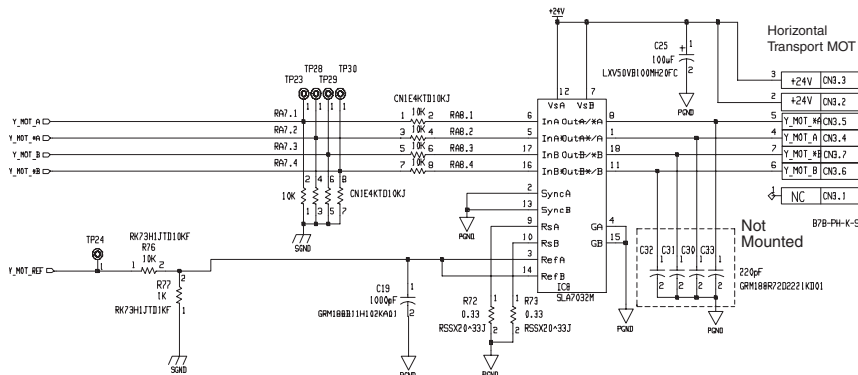
<2> Reverse Motor Drive Circuit (H_MOT)

This circuit rotates/stops H_MOTand controls its rotational direction and the motor current. The circuit consists of the CPU (IC6), the D/A converter (IC13), the constant-current chopper driver IC (IC7), and other elements.

The signals of the stepping-motor drive excitation pattern from the CPU (IC6-Pin118, 120, 121, 122) control the motor rotation speed and rotational direction.

The analog signal from the D/A converter (IC13-Pin5) is divided into the constant voltage by R74 and R75. The divided voltage is applied to IC7-Pin3,14 to set the motor current.

<3> Transport Motor Drive Circuit (Y_MOT)

This circuit rotates/stops Y_MOT and controls its rotational direction and the motor current. The circuit consists of the CPU (IC6), the D/A converter (IC13), the constant-current chopper driver IC (IC8), and other elements.

The signals of the stepping-motor drive excitation pattern from the CPU (IC6-Pin97, 98, 101, 102) control the motor rotation speed and rotational direction.

The analog signal from the D/A converter (IC13-Pin6) is divided into the constant voltage by R76 and R77. The divided voltage is applied to IC8-Pin3,14 to set the motor current.

(4) Flapper Solenoid and Registration Clutch Drive Circuit (F_SOL and R_CL)
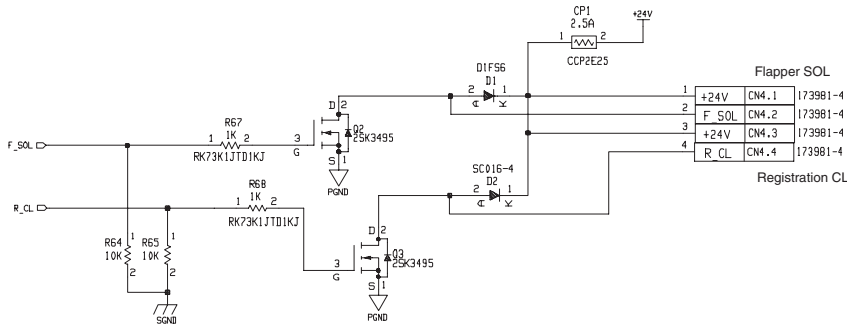


This circuit controls the flapper solenoid operation and the registration clutch engagement.

When the signal F_SOL is "H", Q2 turns on to activate the solenoid. Similarly, when the signal R_CL is "H", Q3 turns on to engage the clutch.

The flapper solenoid drive signal is the PWM signal. At the beginning of the solenoid activation, the signal is adjusted to set the solenoid at 100% duty cycle. After the plunger of the solenoid is pulled in, the signal is adjusted to set the solenoid at 70% duty cycle in order to reduce the temperature rise with the plunger hold.

(5) Reset Circuit
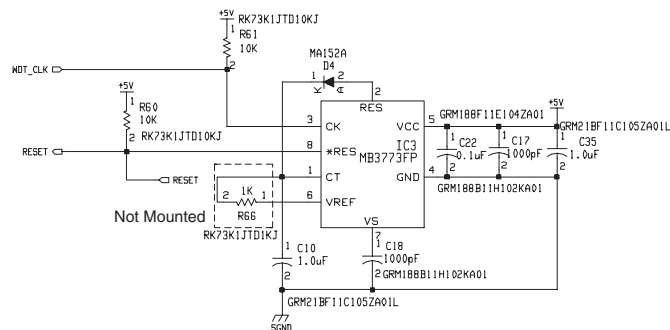
The circuit transmits a reset signal to the CPU when the power is turned on or a power brownout is detected.

The circuit includes a watchdog timer intended to the CPU system operation diagnosis.

After the power is turned on, normally IC3-Pin8 (*RES) is "H". However, when the +5V voltage falls to 4.2V or less because of the power turned off or any trouble, IC3-Pin8 turns "L" to reset the CPU.

The clock signal from the CPU is transmitted to IC3-Pin3 (CK) at a regular interval to clear the watchdog timer embedded in IC3. However, if the clock signal from the CPU disappears because of a system trouble, IC3-Pin8 turns "L" to reset the CPU and stop the system operation.

(6) EEPROM Circuit
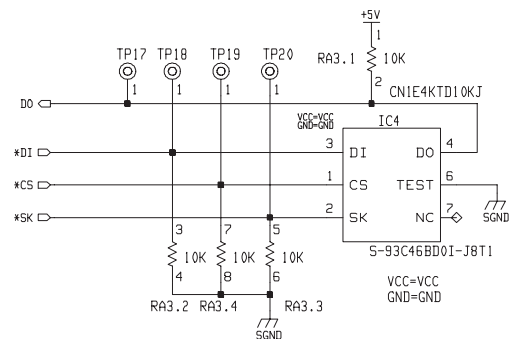
This circuit consists of the data storage EEPROM and the peripheral circuits.

IC4 is a storage memory for the adjustment settings of the reverse sensor (reflective sensor) and the paper width detection potentiometer, and passes the data to the CPU through the four-wire serial interface.

Once data is stored, the data is retained and not cleared even if the power is turned off.

IC4-Pin1 (CS) is the chip selection terminal, and stays "H" during passing data.

IC4-Pin2 (SK) is the serial clock terminal. The serial data is transmitted synchronizing with the clock signal input to the terminal

IC4-Pin3 (DI) is the serial data input terminal. IC4-Pin4 (DO) is the serial data output terminal.

(7) Inrush Current Limiting Circuit


JAM cover open/closed
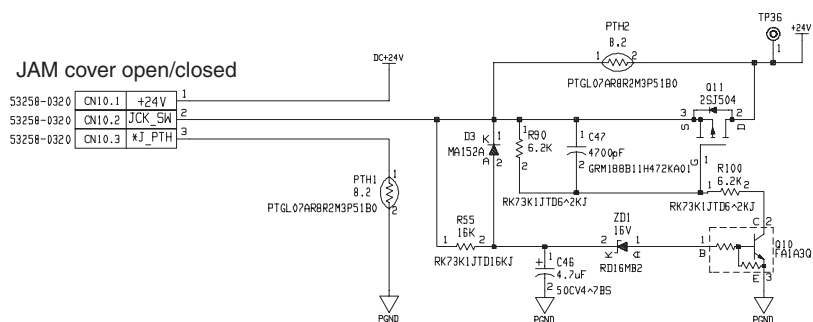
This circuit limits an inrush current flowing into the regeneration capacitor included in the motor drive system to a certain value or less. The circuit consists of the PTC thermistor (PTH2) that limits a current and the FET (Q11) that allows a steady current flowing.

When the JAM cover open/closed detection switch is closed, the cathode voltage of ZD1 starts rising to the zener voltage according to the time constant of R55 and C46. During the rise of the cathode voltage, Q11 is off because no base current to Q10 keeps Q10 off, and then a current flows to PTH2 to charge the regeneration capacitor.

After the regeneration capacitor is fully charged, and the cathode voltage of ZD1 reaches over the zener voltage according to the time constant of R55 and C46, Q11 is turned on because the base current from ZD1 to Q10 turns Q10 on. And then the current flows to Q11 instead of PTH2 to release the current limitation. The circuit consisting of PTH1 and D3 is intended to eliminate the electric charge accumulated in C46 immediately to limit an inrush current generated by momentary opening and shutting of the cover.

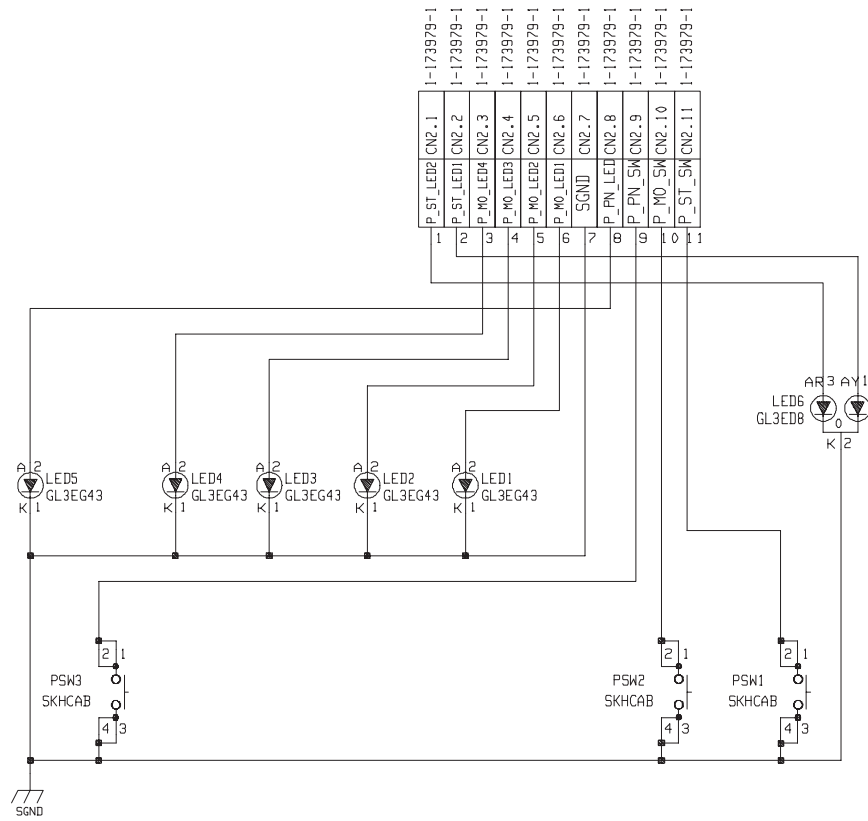## (8) Operator Panel Drive Circuit
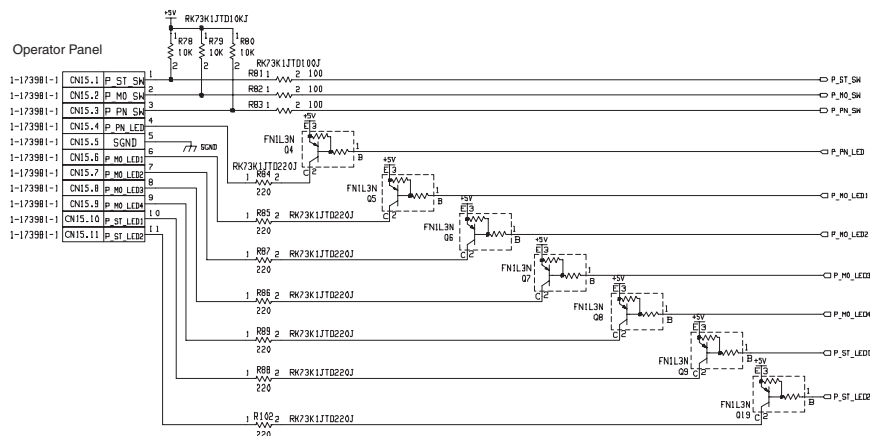
Operator Panel

This circuit includes the input circuits of the switches on the operator panel and the drive circuits of the LEDs.

The circuits connected to CN15-Pin1, 2, 3 are the input circuits of the switches on the operator panel. The input signal from the switch goes "L" when the switch is on, "H" when off.

The circuits connected to CN15-Pin4,6-11 are the drive circuits of the LEDs on the operator panel. The LED lights when the signal is "H", does not light when "L".

(9) Operator Panel Circuit

This is the circuit of the operator panel board.

The operator panel drive board turns each of the LED1-6 on or off, and detects weather each of the PSW1-3 is on or off.
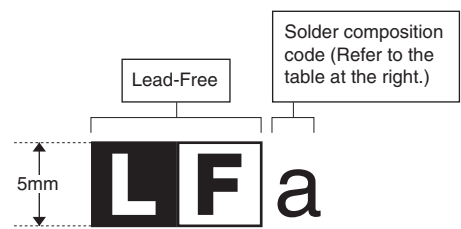
Memo

Memo

LEAD-FREE SOLDER

The PWB's of this model employs lead-free solder. The "LF" marks indicated on the PWB's and the Service Manual mean "Lead-Free" solder. The alphabet following the LF mark shows the kind of lead-free solder.

Example:

Solder composition code (Refer to the table at the right.)

Lead-Free

5mm

LFa

<Solder composition code of lead-free solder>

Solder composition	Solder composition code
Sn-A̲g-Cu	a
Sn-Ag-B̲i Sn-Ag-B̲i-Cu	b
Sn-Z̲n-Bi	z
Sn-I̲n-Ag-Bi	i
Sn-Cu-N̲i	n
Sn-Ag-S̲b	s
Bi-Sn-Ag-P̲ Bi-Sn-Ag	p

(1) NOTE FOR THE USE OF LEAD-FREE SOLDER THREAD

When repairing a lead-free solder PWB, use lead-free solder thread.
Never use conventional lead solder thread, which may cause a breakdown or an accident.
Since the melting point of lead-free solder thread is about 40°C higher than that of conventional lead solder thread, the use of the exclusive-use soldering iron is recommendable.

(2) NOTE FOR SOLDERING WORK

Since the melting point of lead-free solder is about 220°C, which is about 40°C higher than that of conventional lead solder, and its soldering capacity is inferior to conventional one, it is apt to keep the soldering iron in contact with the PWB for longer time. This may cause land separation or may exceed the heat-resistive temperature of components. Use enough care to separate the soldering iron from the PWB when completion of soldering is confirmed.
Since lead-free solder includes a greater quantity of tin, the iron tip may corrode easily. Turn ON/OFF the soldering iron power frequently.
If different-kind solder remains on the soldering iron tip, it is melted together with lead-free solder. To avoid this, clean the soldering iron tip after completion of soldering work.
If the soldering iron tip is discolored black during soldering work, clean and file the tip with steel wool or a fine filer.

CAUTION FOR BATTERY REPLACEMENT

(Danish)   ADVARSEL !
Lithiumbatteri – Eksplosionsfare ved fejlagtig håndtering.
Udskiftning må kun ske med batteri
af samme fabrikat og type.
Levér det brugte batteri tilbage til leverandoren.

(English)   Caution !
Danger of explosion if battery is incorrectly replaced.
Replace only with the same or equivalent type
recommended by the manufacturer.
Dispose of used batteries according to manufacturer's instructions.

(Finnish)   VAROITUS
Paristo voi räjähtää, jos se on virheellisesti asennettu.
Vaihda paristo ainoastaan laitevalmistajan suosittelemaan
tyyppiin. Hävitä käytetty paristo valmistajan ohjeiden
mukaisesti.

(French)   ATTENTION
Il y a danger d'explosion s' il y a remplacement incorrect
de la batterie. Remplacer uniquement avec une batterie du
même type ou d'un type équivalent recommandé par
le constructeur.
Mettre au rebut les batteries usagées conformément aux
instructions du fabricant.

(Swedish)   VARNING
Explosionsfara vid felaktigt batteribyte.
Använd samma batterityp eller en ekvivalent
typ som rekommenderas av apparattillverkaren.
Kassera använt batteri enligt fabrikantens
instruktion.

(German)   Achtung
Explosionsgefahr bei Verwendung inkorrekter Batterien.
Als Ersatzbatterien dürfen nur Batterien vom gleichen Typ oder
vom Hersteller empfohlene Batterien verwendet werden.
Entsorgung der gebrauchten Batterien nur nach den vom
Hersteller angegebenen Anweisungen.

CAUTION FOR BATTERY DISPOSAL

(For USA, CANADA)

"BATTERY DISPOSAL"
THIS PRODUCT CONTAINS A LITHIUM PRIMARY
(MANGANESS DIOXIDE) MEMORY BACK-UP BATTERY
THAT MUST BE DISPOSED OF PROPERLY. REMOVE THE
BATTERY FROM THE PRODUCT AND CONTACT YOUR
LOCAL ENVIRONMENTAL AGENCIES FOR INFORMATION
ON RECYCLING AND DISPOSAL OPTIONS.

"TRAITEMENT DES PILES USAGÉES"
CE PRODUIT CONTIENT UNE PILE DE SAUVEGARDE DE
MÉMOIRE LITHIUM PRIMAIRE (DIOXYDE DE MANGANÈSE)
QUI DOIT ÊTRE TRAITÉE CORRECTEMENT. ENLEVEZ LA
PILE DU PRODUIT ET PRENEZ CONTACT AVEC VOTRE
AGENCE ENVIRONNEMENTALE LOCALE POUR DES
INFORMATIONS SUR LES MÉTHODES DE RECYCLAGE ET
DE TRAITEMENT.

SHARP

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